

Notes on use of new DRM-64 Interak Card.

Some points to stress:

1. U8 (1 off 74LS365). If these are difficult to obtain, 74LS367 can be used instead. 74LS365A and 74LS367A are the usual types found nowadays, but the A suffix has no relevance to the use of these devices on this card.
2. U9,10 (2 off 74LS257A). It is vital here that the "A" suffix device be used. In the event of supply difficulty 74LS257A can often be "borrowed" from the VDU-K card, and in the empty spaces created on the VDU-K card an ordinary 74LS257, or 74LS157, can be used instead, since the use of "A" suffix devices is immaterial on the VDU-K card. (An alternative to the the 74LS257A on the DRM-64K is the 74LS258A, the inverting version: in times of shortage it is often easier to procure the '258A.)
3. U11,20 (2 off 74LS244). A suitable substitute for either or both of U11 and U20 is 74LS240 (the inverting version of the 74LS244).
4. U12-19 (8 off 4564). These are also known by various numbers, e.g. MB8264-15, M3764-15, 27264 etc. For 4 MHz operation with a Z80A CPU and no wait states, the important parameters of the 4564 devices for use on the DRM-64 are:

Single 5V supply, Access time 150ns, 7-bit (2ms) Refresh.

(Note particularly that the Texas Instruments part, e.g. TMS 4164-15, is unsuitable because it requires an 8-bit (4ms) refresh, which the Z80A CPU is unable to provide; and even if it could, the DRM-64 could not accept it, as the track has been laid out to make it compatible with 16K 5V RAMs, which all have the 7-bit (2ms) refresh requirement.

5. Modern high-speed 5V DRAMs are very susceptible to data corruption due to noise on the system bus. It is recommended that care be taken in arranging the cards in the rack so as to minimise this problem. One arrangement which is suitable is described next, but no doubt there are others:

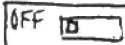

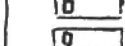
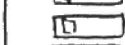

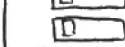
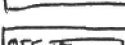
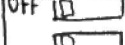
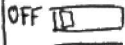




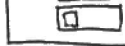

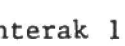
The CPU card (MZB-3) should be to the extreme left, with the DRM-64 in the adjacent slot. Other cards which use the memory space should be inserted next (e.g. VDU-K, Programmable Character Generator, EPROM programmer, ROM/RAM card, Static RAM). At the right-hand end of the bus the cards which do not use the memory space should be positioned (e.g. Keyboard input, Floppy disk Interface, Tape Cassette Interface, Serial RS-232 Interface, Parallel Printer Interface, Sound Generator, Input Cards and Output Cards).

Since the use of the plug in Extender Card aggravates reflections and other noise on the bus, it is possible that bad results will be obtained if the DRM-64 is used plugged into the Extender Card;

even if you use the Extender merely for testing other cards, you should still be on your guard to expect some corruptions of the contents of the RAMs on the DRM-64. (If you own an Extender Card, store it somewhere else when not in use - never leave it "parked" in a spare slot in the system rack.)

6. Two 16-pin 8x SPST DIL switches (S1,2) are provided: their function is to disable the DRM-64 on any of the 16 off 4K pages: i.e. switch "on" = page disabled. The purpose of this is to allow "holes" to be made in the computer's memory map to make space for other memory using cards (e.g. EPROM Card, EPROM Programmer, Video RAM, Programmable Character Generator etc.)

The switches have the following significance:

S1a		ON	F000-FFFF	} ('OFF' FOR VDU-2K, 'ON' VDU-K)
S1b			E000-EFFF	
S1c			D000-DFFF	
S1d			C000-CFFF	
S1e			B000-BFFF	
S1f			A000-AFFF	
S1g			9000-9FFF	
S1h			8000-8FFF	
S2a		ON	7000-7FFF	} Switch "on" to disable DRM-64 at addresses listed; switch "off" to enable DRM-64 at these addresses.
S2b			6000-6FFF	
S2c			5000-5FFF	
S2d			4000-4FFF	
S2e			3000-3FFF	
S2f			2000-2FFF	
S2g			1000-1FFF	
S2h			0000-0FFF	

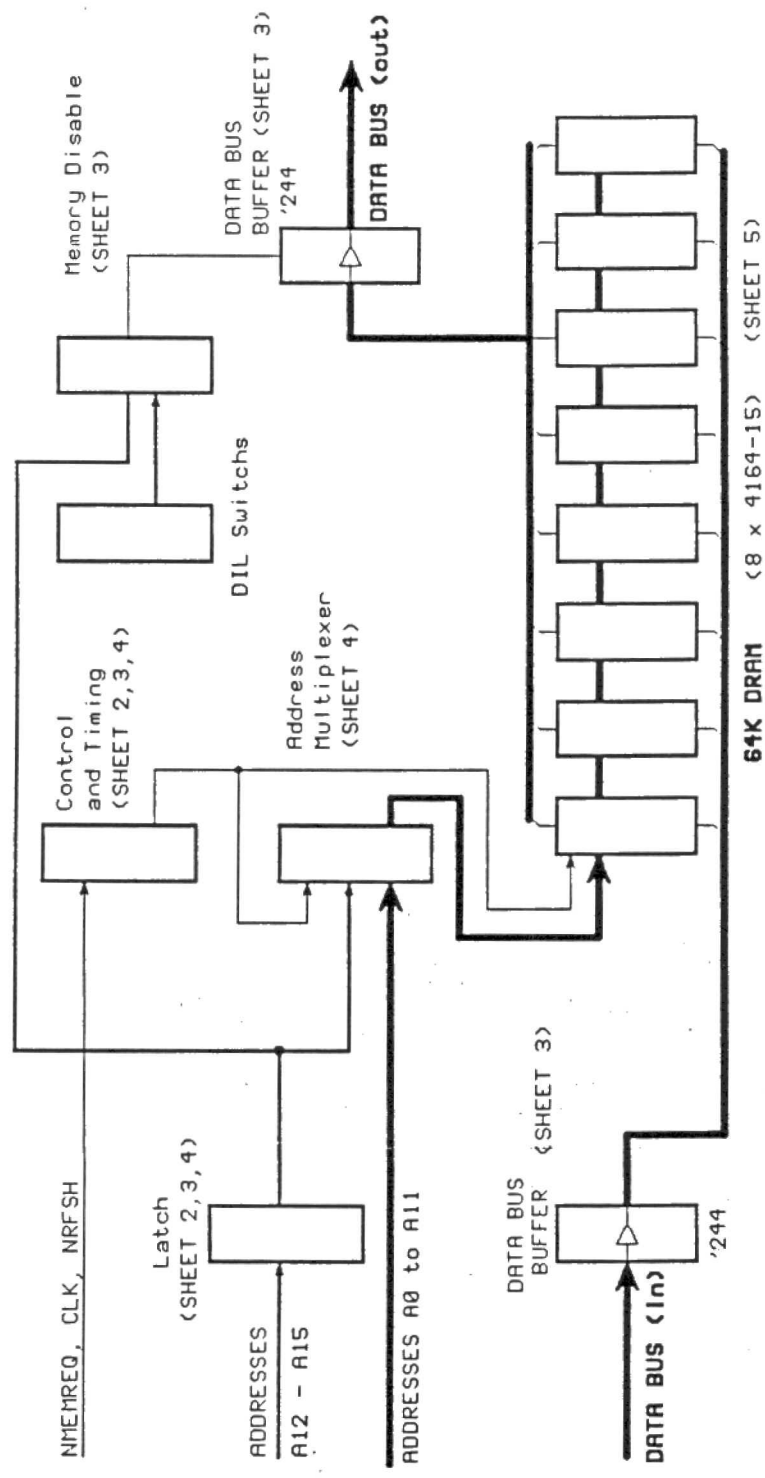
Example: Interak 1 requires contiguous RAM for 48K starting at 0000 and ending at BFFF, the remainder being left clear for other cards (i.e. addresses C000 to FFFF are to be disabled on the DRM-64):-

Make the upper four switches of S1 (i.e. S1a-d) "on" to disable pages C, D, E, F, and the lower four switches of S1 (i.e. S1e-h) plus all of S2 (i.e. S2a-h) "off" to enable the DRM-64 card on pages 0 to B.

NOTE. TYPICAL DISK SYSTEM REQUIRE MORE RAM therefore S1b-d should now be set 'OFF' Switch S1a depends on VDU in use.

D.M.P. 16/9/83

16/5/82.



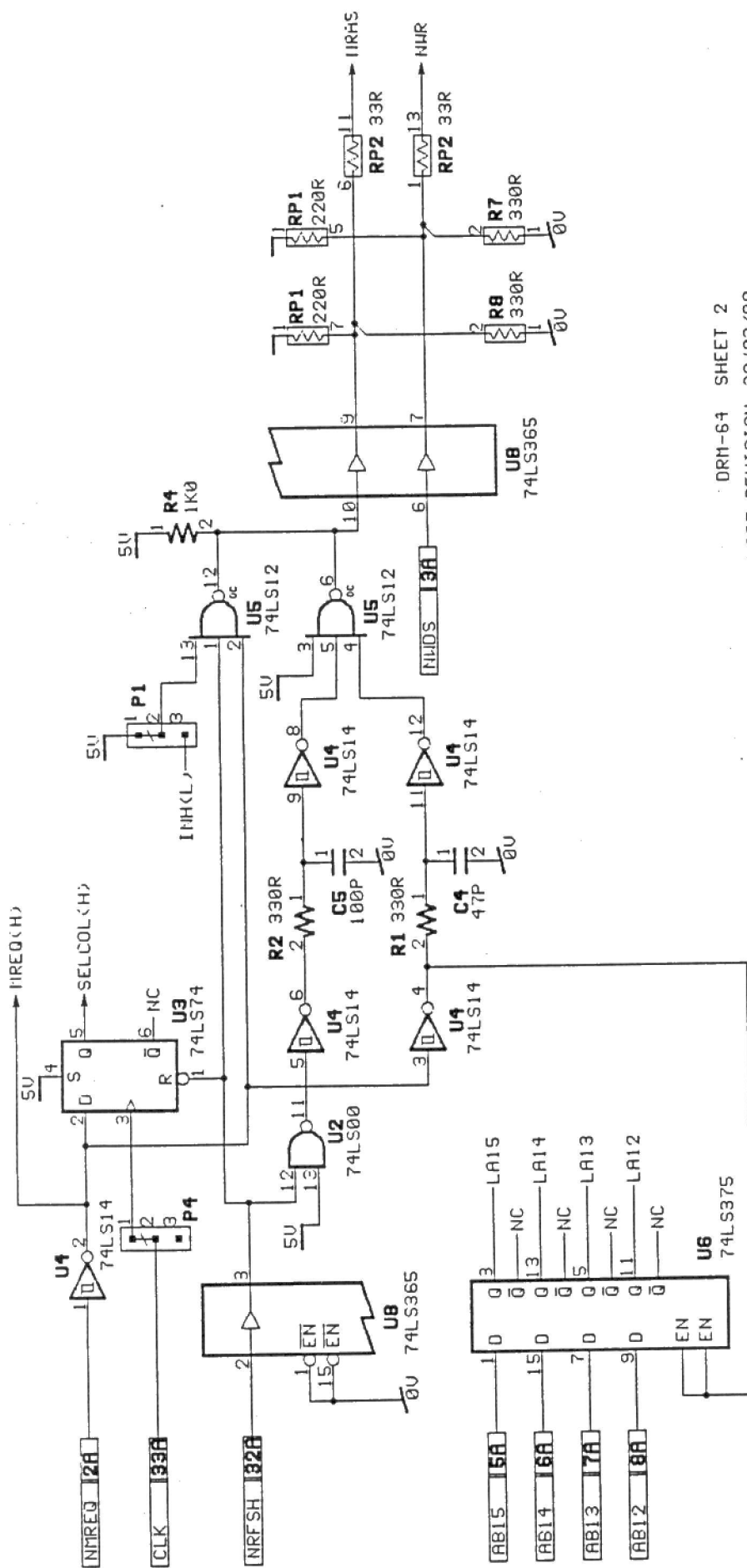
Interak

Drawn JHP

Date 881108

Scale -

DRM64 CIRCUIT DIAGRAM SHEET 1:
BLOCK DIAGRAM



DRM-64 SHEET 2
LAST REVISION 30/03/89

REVISED 30-3-87

Drawn JHP

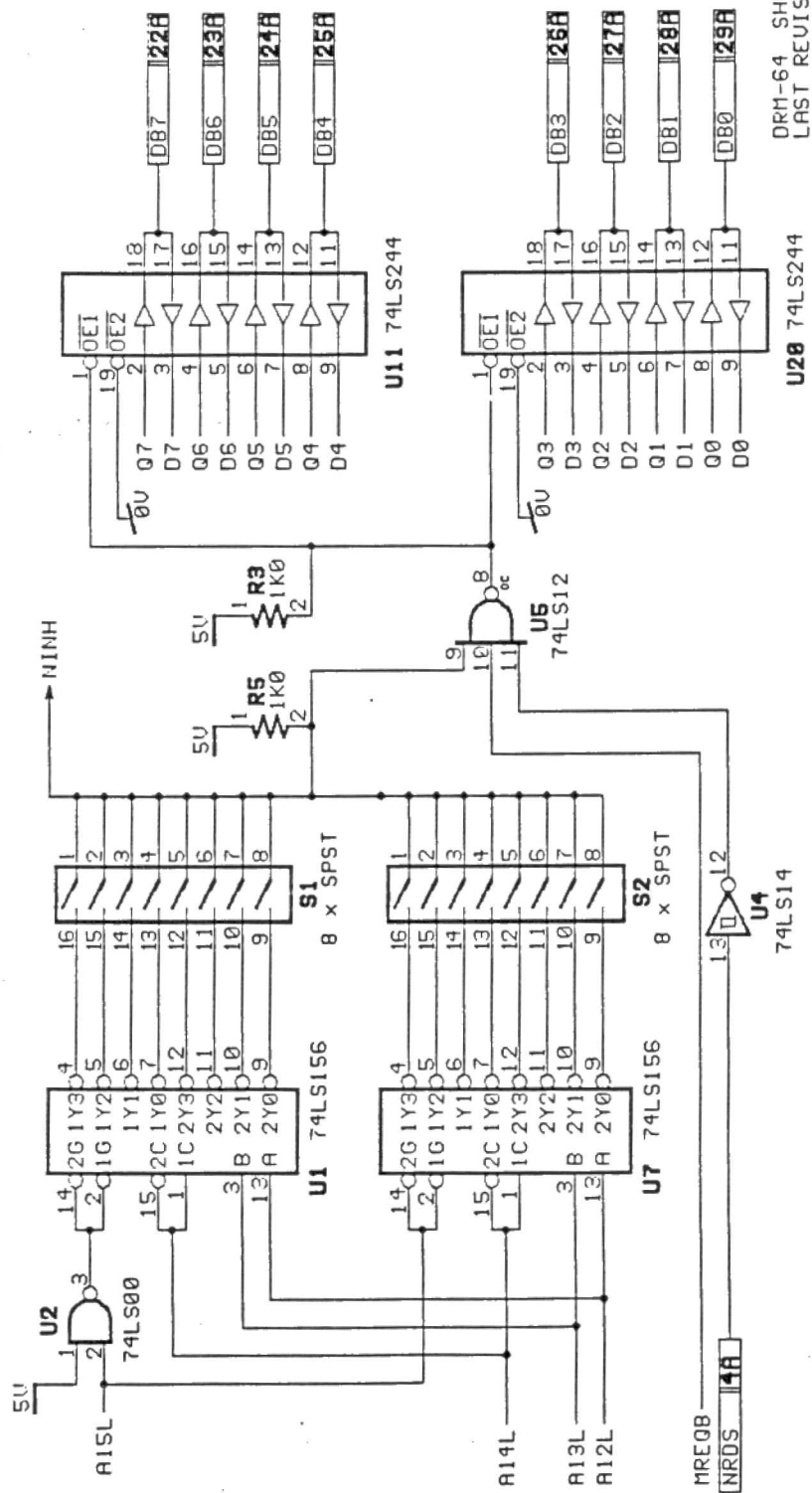
Date 88/11/08

Scale -

Intertrak

DRAM-64 CIRCUIT DIAGRAM SHEET 2:
ADDRESS LATCH; PRECHARGE
EXTENDER

2 OF 6



DRM-64 SHEET 3
LAST REVISION 30/03/89

Drawn JHP

Date 881108

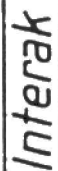
Scale —

REVISED 30-3-89

Interak

DRM-64 CIRCUIT DIAGRAM SHEET 3:
4K PAGE DISABLES; DATA BUS
BUFFERS

3 OF 6



Scale

4 of 6

COMPONENT PRICE LIST FOR DRM-64 CARD
(Prices exclude VAT)

List Ref: DRM-64/P3
October 1983, Revised July 1985
Prices each, ex.VAT

Resistors 0.25W

CR25330	5	R1,2,6,7,8	0.02	0.10
CR1K0	3	R3,4,5	0.02	0.06

DIL Resistors (Use 16-pin Socket)

DIL8-33R	2	DIL1,2	0.57	1.14
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SIL Resistors (Use 9-pin Socket)

SIL8-220R	2	SIL1,2	0.26	0.52
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Resistor Pack PDRM64 1.82 1.82

Capacitors

("MAL" = Low Leakage Miniature Aluminium Electrolytic; "CER" = Ceramic; "DEC" = 47n-100n Decoupling grade polyester, or Ceramic)

CER47P	1	C4	0.05	0.05
CER100P	1	C5	0.05	0.05
DEC	26	C1-3,6-13,15-21,23,25-31	0.09	2.34
MAL22U	5	C14,22,24,32,33	0.09	0.45

Capacitor Pack CDRM64 2.89 2.89

Integrated Circuits (Use Sockets)

4564-15	8	U12-19 (16 pin)	1.50	2.75 36.00 12.00
74LS00	1	U2 (14 pin)	0.36	0.36
74LS12	1	U5 (14 pin)	0.36	0.36
74LS14	1	U4 (14 pin)	0.49	0.49
74LS74	1	U3 (14 pin)	0.41	0.41
74LS156	2	U1,7 (16 pin)	0.74	1.48
74LS240/244	2	U11,20 (20 pin)	1.08	2.16
74LS257A/278A	2	U9,10 (16 pin)	0.56	1.12
74LS365/367	1	U8 (16 pin)	0.51	0.51
74LS375	1	U6 (16 pin)	0.62	0.62

Integrated Circuit Pack ICDRM64 37.91 ~~37.91~~ 19.51

DIL Switches

DILSW8	2	S1,S2 (16 pin)	1.50	3.00
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DIL Switch Pack SWDRM64 3.00 3.00

DIL & SIL Sockets

9SCON	2	SIL1,2	0.06	0.12
DIL14	4	U2,3,4,5	0.10	0.40
DIL16	18	DIL1,2; S1,2, U1,6-10,12-19	0.10	1.80
DIL20	2	U11,20	0.22	0.44

DIL Socket Pack SKDRM64 2.70 2.70

Total cost of kit of all parts listed so far PDRM64: 47.92 29.92

OPTIONS (i.e. Items not included in standard kit of parts)

DRM-64 p.c.b., sold separately as "BDRM64"	18.75
Manual, sold separately as "MDRM64" (Zero Rated for VAT)	2.00 0%
(Note Manual not available for sale yet - still in preparation)	
1" Card Front Kit, inc fixings and mtg. brackets, new type CF1	2.99
ditto, old (RS) type OCF1	3.99

Add 50p handling charge to each transaction, and 15% VAT.

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Merseyside. L62 5AG

Telephone:- 051-645 3391

Access/Visa Welcome (no surcharges).